Transplantation of autologous bone marrow stromal cells (BMSC) for CNS disorders – Strategy and tactics for clinical application

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Background

There is increasing evidence that the transplanted bone marrow stromal cells (BMSC) significantly promote functional recovery after central nervous system (CNS) damage in the animal models of various kinds of CNS disorders, including cerebral infarct, brain contusion and spinal cord injury. However, there are several shortages of information when considering clinical application of BMSC transplantation for patients with neurological disorders. In this paper, therefore, we discuss what we should clarify to establish cell transplantation therapy in clinical situation and describe our recent works for this purpose.

Methods and Results

The BMSC have the ability to alter their gene expression profile and phenotype in response to the surrounding circumstances and to protect the neurons by producing some neurotrophic factors. They also promote neurite extension and rebuild the neural circuits in the injured CNS. Using optical imaging and MRI techniques, the transplanted BMSC can non-invasively be tracked in the living animals for at least 8 weeks after transplantation. Functional imaging such as PET scan may have the potential to assess the beneficial effects of BMSC transplantation. The BMSC can be expanded using the animal protein-free culture medium, which would maintain their potential of proliferation, migration, and neural differentiation.

Conclusion

It is urgent issues to develop clinical imaging technique to track the transplanted cells in the CNS and evaluate the therapeutic significance of BMSC transplantation in order to establish it as a definite therapeutic strategy in clinical situation in the future.